

# SOUTHERN CROSSING

## Of San Francisco Bay



**INDIA BASIN-ALAMEDA & SIERRA POINT-ROBERTS LANDING ALIGNMENT STUDIES**

**February 1966**

STATE OF CALIFORNIA-EDMUND G. BROWN-GOVERNOR-TRANSPORTATION AGENCY-DEPARTMENT OF PUBLIC WORKS-DIVISION OF BAY TOLL CROSSINGS -151 FREMONT ST.- SAN FRANCISCO

STATE OF CALIFORNIA

TRANSPORTATION AGENCY  
1120 N STREET, SACRAMENTO

EDMUND G. BROWN, Governor



STATE OF CALIFORNIA

TRANSPORTATION AGENCY  
1120 N STREET, SACRAMENTO

EDMUND G. BROWN, Governor



February 1, 1966

February 1, 1966

Honorable Joseph A. Beck  
Secretary of the Senate  
State Capitol  
Sacramento, California

Dear Mr. Beck:

Chapter 470, Statutes of 1965, requires that a final report on the Southern Crossing studies be submitted to the Legislature by February 1, 1966. It is my pleasure to submit to you a report entitled "Southern Crossing Studies of San Francisco Bay, India Basin-Alameda and Sierra Point-Roberts Landing Alignments, February, 1966". The report was prepared by the Division of Bay Toll Crossings, Department of Public Works.

Respectfully submitted,

A handwritten signature in black ink.

ROBERT B. BRADFORD  
Administrator  
Transportation Agency

Honorable James D. Driscoll  
Chief Clerk of the Assembly  
State Capitol  
Sacramento, California

Dear Mr. Driscoll:

Chapter 970, Statutes of 1965, requires that a final report on the Southern Crossing studies be submitted to the Legislature by February 1, 1966. It is my pleasure to submit to you a report entitled "Southern Crossing Studies of San Francisco Bay, India Basin-Alameda and Sierra Point-Roberts Landing Alignments, February, 1966". The report was prepared by the Division of Bay Toll Crossings, Department of Public Works.

Respectfully submitted,

A handwritten signature in black ink.

ROBERT B. BRADFORD  
Administrator  
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STATE OF CALIFORNIA—TRANSPORTATION AGENCY  
DEPARTMENT OF PUBLIC WORKS  
1120 N STREET  
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EDMUND G. BROWN, Governor



STATE OF CALIFORNIA—TRANSPORTATION AGENCY  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF BAY TOLL CROSSINGS  
151 FREMONT STREET  
SAN FRANCISCO, CALIFORNIA 94105

EDMUND G. BROWN, Governor



January 19, 1966

Honorable Robert E. Bradford  
Administrator  
Transportation Agency  
Sacramento, California

Dear Sir:

This transmits a report of the Division of Bay Toll Crossings on the feasibility of financing and constructing a Southern Crossing of San Francisco Bay.

This report indicates that an additional crossing could be constructed beginning in 1968. However, an increase in the commitment of the Toll Revenue Fund to the Bay Area Rapid Transit District Tube would be an important factor in the financial feasibility of a Southern Crossing.

The study shows that traffic service for present and future needs and the predominance of other benefits are obtained from the India Basin-Alameda route.

The Department is required to submit this report to the Legislature during the 1966 regular session not later than February 1, 1966.

Respectfully submitted,

JOHN ERRECA  
Director of Public Works

Honorable John Erreca  
Director of Public Works  
Sacramento, California

Dear Sir:

Transmitted herewith is a report titled "Southern Crossing Studies of San Francisco Bay, India Basin-Alameda and Sierra Point-Roberts Landing Alignments, February 1966". The report was prepared by the Division of Bay Toll Crossings pursuant to Chapter 970, Statutes of 1965, and a resolution adopted by the California Toll Bridge Authority on February 18, 1965.

The report shows that the Toll Revenue Fund has an approximate bonding capacity of \$250 million. The report further shows that construction of a new crossing could begin in 1968. This is predicated on the present commitment of Toll Revenue Funds to the BARTD Tube. If this commitment is increased, it would have a serious effect on the financing of the new crossing. Because of the above limit on bonding capacity, both of the crossings studied cannot be built at the same time.

The study also shows that the provision for present and future traffic needs and the predominance of additional benefits to the region are obtained from the India Basin-Alameda Crossing.

Respectfully submitted,

E. R. FOLEY  
Chief Engineer

# CONSULTANTS

In the preparation of this report, the Division obtained the services of other State agencies and private consulting firms as necessary in order to develop the most accurate and complete data. Recognition is made of the following who have provided valued assistance during the conduct of these studies:

Soils and Foundations

Dames and Moore

Financial

Blyth and Company, Incorporated

Traffic

Wilbur Smith and Associates, Incorporated

Department of Public Works

Division of Highways  
Urban Planning Department  
District 4, Planning and Right of Way

Division of Contracts and Rights of Way

## ACKNOWLEDGMENTS

In preparing a report of such broad scope, much help was received from many governmental agencies, interested local organizations, firms, and individuals.

The Bay Area Transportation Study Commission provided a portion of the basic economic data which was used in traffic model analysis and also land use maps which were developed by the Association of Bay Area Governments as part of their contribution to the BATS study. Discussions were held with the BATS staff during which information and advice concerning the traffic studies were received.

Data indicating the effect of rapid transit patronage on the transbay traffic volumes was provided by the Bay Area Rapid Transit District.

Meetings were held with the Pacific American Steamship Association, the Army and the Navy, to obtain the benefit of their knowledge regarding the effect of the proposed transbay crossings on navigation. Also, the staffs of the 12th Naval District, Alameda Naval Air Station and the San Francisco Naval Shipyard were contacted to discuss the effect the crossings would have on their facilities.

At the State level, meetings were held with the staffs of the Division of Highways, Division of Aeronautics, Bay Conservation and Development Commission, the Institute of Transportation and Traffic Engineering of the University of California, as well as with BATS. Contacts were made with representatives of the State Lands Commission relative to the foundation explorations.

Information was obtained from various counties concerned with the project through contacts with their staffs and individual county supervisors. Many of the cities in the area furnished information. Meetings were held with staffs and city councils. Also, the Port of Oakland and the Port of San Francisco were contacted to determine the affect of the crossings on their existing and planned developments.

Discussions were held with major public utilities and railroads during the course of the study. Park districts, school districts, flood control districts, chambers of commerce of cities and counties, and major property owners affected in some way by the crossing were also contacted.

Letters and resolutions were received from several organizations with expressions of their opinions and desires regarding the project. Several boat building firms furnished information, made presentations and joined in discussions of surface craft facilities. The Institute of Transportation and Traffic Engineering of the University of California, assisted particularly in the surface craft study.

All of the above-named agencies and organizations cooperated wholeheartedly in the furnishing of data and in discussions of the crossings as they might affect their interests. Grateful acknowledgment is made for all of the help received during the preparation of this report.

# TABLE OF CONTENTS

## SUMMARY

Summary . . . . .	xv
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## I. INTRODUCTION

Introduction . . . . .	3
Growth . . . . .	3
Southern Crossing . . . . .	4
Funds . . . . .	5

## II. INDIA BASIN-ALAMEDA

History . . . . .	15
Transbay Crossing . . . . .	15
Main Channel Structure . . . . .	15
High-Level Bridge . . . . .	16
Subaqueous Tube . . . . .	16
Approaches . . . . .	28
Discussion . . . . .	32
Cost Estimate . . . . .	36

## III. SIERRA POINT-ROBERTS LANDING

History . . . . .	41
Transbay Crossing . . . . .	41
Crossing Types . . . . .	41
Trestle and High-Level Bridge . . . . .	42
Barrier . . . . .	42
Approaches . . . . .	54
Discussion . . . . .	58
Cost Estimate . . . . .	60

## IV. SURFACE CRAFT

Surface Craft . . . . .	63
Previous Ferry Service . . . . .	63
Existing Mass Transit System . . . . .	63
BARTD System Under Construction . . . . .	64
Evaluation of New Types of Surface Craft . . . . .	65
Hydrofoil . . . . .	65
Air Cushion Vehicle . . . . .	65
General . . . . .	66
Possible Surface Craft System . . . . .	67
Conclusions . . . . .	67

## V. FOUNDATIONS

Introduction . . . . .	73
Geology of the Area . . . . .	73
Geologic Formations . . . . .	73
Current Investigation . . . . .	73
India Basin-Alameda . . . . .	74
Sierra Point-Roberts Landing . . . . .	76

## VI. TRAFFIC

Introduction . . . . .	81
Description of Traffic Model . . . . .	81
Rapid Transit . . . . .	83
Results . . . . .	83
Estimated Traffic Volumes . . . . .	83
Traffic Service . . . . .	84
No Additional Crossings . . . . .	84

VII. FINANCIAL

Financial . . . . .	89
Existing Tube Obligation . . . . .	91
Additional Obligation for Tube . . . . .	92

VIII. LEGAL

Legal . . . . .	97
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IX. CONCLUSIONS

Discussion and Evaluation . . . . .	103
India Basin-Alameda . . . . .	103
Sierra Point-Roberts Landing . . . . .	104
Evaluation of Benefits . . . . .	104
Summary of Conclusions . . . . .	105

RECOMMENDATIONS

Recommendations . . . . .	109
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# ILLUSTRATIONS

## I. INTRODUCTION

Area Map . . . . .	2
West Bay . . . . .	6 & 7
East Bay . . . . .	8 & 9, 11

## II. INDIA BASIN-ALAMEDA

Navigational Clearances and Roadway Sections (India-Basin) . . . . .	17
Tied Arch . . . . .	18 & 19
Cable Braced Girder (1) . . . . .	20 & 21
Cable Braced Girder (11) . . . . .	22 & 23
Double Decked Truss . . . . .	24 & 25
Tube . . . . .	26 & 27
India Basin Terminus . . . . .	29
Alameda Terminus . . . . .	30 & 31
India Basin (Oblique Photograph) . . . . .	33
Alameda (Oblique Photograph) . . . . .	35
Bay Farm Island (Oblique Photograph) . . . . .	37

## III. SIERRA POINT-ROBERTS LANDING

Navigational Clearances and Roadway Sections (Sierra Point) . . . . .	43
Tied Arch . . . . .	44 & 45
Orthotropic Box Girder . . . . .	46 & 47
Orthotropic Deck Truss . . . . .	48 & 49
Double Deck Truss . . . . .	50 & 51
Orthotropic Box Girder and Barrier . . . . .	52 & 53
Sierra Point Terminus . . . . .	55
Roberts Landing Terminus . . . . .	56 & 57
Roberts Landing (Oblique Photograph) . . . . .	59

## IV. SURFACE CRAFT

Hydrofoil . . . . .	65
Air Cushion Vehicle . . . . .	66
Transbay Transit Routes . . . . .	68

## V. FOUNDATIONS

Profile of Sediments (India Basin) . . . . .	75
Profile of Sediments (Sierra Point) . . . . .	77

## VI. TRAFFIC

1964 Land Use Map . . . . .	After 82
1990 Land Use Map . . . . .	After 82
Trip End Generations . . . . .	After 86
1975 Flow Diagram (India Basin) . . . . .	After 86
1975 Flow Diagram (Sierra Point) . . . . .	After 86
1990 Flow Diagram (India Basin) . . . . .	After 86
1975 Flow Diagram (Sierra Point) . . . . .	After 86

## SUMMARY

This report presents the results of the studies requested by the California State Legislature and the California Toll Bridge Authority concerning the feasibility of financing and constructing a crossing from India Basin in San Francisco to Alameda-Bay Farm Island and a crossing from Sierra Point in San Mateo County to Roberts Landing in Alameda County.

The approach routes connecting to the existing freeway system were developed for a crossing in each corridor to the extent necessary to determine their effect on the communities, the service which they would provide and estimates of their construction costs. Structural design studies were undertaken for the channel crossings including both high-level bridges and subaqueous vehicular tubes. Also, for the Sierra Point-Roberts Landing alignment, the U. S. Army, Corps of Engineers barrier studies were reviewed and updated. In the design studies for the bridge structures special emphasis was given to esthetic considerations for both those viewing the bridge and those travelling across the bridge.

Foundation studies were made to determine the conditions which would be encountered in the construction of either crossing. These studies included foundation borings, laboratory testing of soil samples and the development of representative soil profiles at each crossing alignment.

The feasibility of a surface craft system to provide services comparable to a highway crossing was evaluated. The relationship of such a system with existing and future mass transit systems was studied.

Future transbay trips were predicted by means of an analytical traffic model which enabled the changing landuse patterns of the Bay region to be reflected in the estimates of future traffic. The effect of the rapid transit system was determined by the Bay Area Rapid Transit District. Traffic volumes were estimated for the years 1975 and 1990 on each of the two crossings studied.

The financial feasibility of the project was evaluated based on existing legislation limits of obligation to the Bay Area Rapid Transit system. Also, the possibility of an increase in this obligation was noted and evaluated to the extent possible. The statutes related to the project were investigated and summarized.

The conclusions of the study and recommendations for proceeding with the construction of an additional crossing are presented.

OCEAN

PACIFIC



# CHAPTER I

## INTRODUCTION

San Francisco Bay, one of the world's greatest natural harbors, is spanned by five major bridges from its northern end, where it connects with San Pablo Bay, to its southern end near San Jose. These include two of world renown; the San Francisco-Oakland Bay Bridge, opened in 1936, and the Golden Gate Bridge,\* opened in 1937. Other major crossings include the Richmond-San Rafael Bridge, opened in 1956; and two older bridges, the San Mateo-Hayward and Dumbarton, which were purchased by the State from private owners in 1951. There are two other major crossings in the area which span the Carquinez Strait, near Vallejo, and Suisun Bay between Martinez and Benicia.

## GROWTH

California has experienced unprecedented growth since World War II. The San Francisco Bay Area has been a major participant in this growth. The influx of people and resultant increased use of motor vehicles has brought heavier and heavier traffic to the area's highways and bridges. This is particularly true of transbay traffic in the east-west direction between the Counties of San Francisco and San Mateo on the west and Alameda

and Contra Costa on the east. There is an especially large traffic movement between San Francisco and the Oakland metropolitan area, including Contra Costa County. In the year 1965, this transbay traffic desire resulted in an average of 135,800 vehicles per day using the San Francisco-Oakland Bay Bridge. There was an average daily volume of 14,500 on the San Mateo-Hayward Bridge, 13,000 on the Richmond-San Rafael Bridge, and 10,000 on the Dumbarton Bridge.

The transportation system serving a large urban area is a vitally important factor affecting the life of area residents. Business, educational, cultural, and recreational activities need an efficient transportation system in order to flourish. Without adequate transbay crossings and connections to freeway systems, healthy growth will be impossible and movement of people and goods seriously restricted.

Twenty years ago, far-sighted people in the Bay Area and in State Government were aware of the need for added capacity to handle this great east-west movement. The Toll Bridge Authority, by resolution in 1945, directed the Department of Public Works to study the possibility of increasing east-west transbay capacity by the construction of an additional crossing.

\* The Golden Gate Bridge was constructed and is operated by the Golden Gate Bridge and Highway District.

#### SOUTHERN CROSSING

The investigation and study by the Department of Public Works resulted in a proposal to construct a bridge adjacent to the San Francisco-Oakland Bay Bridge, with each structure to handle traffic in one direction. After several years of public discussion, this idea was dropped. In 1953, legislation was enacted under Chapter 1056, directing the Department of Public Works to finance and construct a crossing between Army Street in San Francisco and Bay Farm Island in Alameda County. It was not possible to finance this project at the then existing toll rate and this project was dropped in 1958. In 1962, the Department of Public Works published the "Transbay Traffic Study", which presented a traffic analysis for the entire San Francisco Bay Area and included two possible routes for a southern crossing.

Starting early in 1964, the Toll Bridge Authority reviewed the two southern crossing routes on the basis of their effect on the communities connected, the traffic service provided as a part of the transportation network of the area, relief provided for the congested San Francisco-Oakland Bay Bridge, economic benefit to the area, and cost.

Three hearings were held by the Toll Bridge Authority in 1964 and early 1965. There was almost unanimous support for a southern crossing.

Many groups advocated that crossings be constructed on both routes. The interested individuals and groups differed only on the priority to be given to construction. In general, San Francisco County, northern Alameda County, and Contra Costa County backed the more northerly of the two routes. San Mateo County and portions of southern Alameda County generally favored the more southerly of the two routes. When no consensus could be obtained, members of the Toll Bridge Authority and of the Legislature expressed their desire to have further engineering studies made. The intent was to further develop the approach patterns on each route in order to better define (1) total effect on the communities involved, (2) integration of the crossings into the existing and planned freeway network, (3) service to local and regional areas, (4) the effect on local street and road systems, and (5) the rights of way which would have to be acquired.

The Toll Bridge Authority, by resolution at its meeting of February 18, 1965, requested the Legislature to authorize such a study. The Legislature followed this request by enactment of Chapter 970, Statutes of 1965. This act authorizes the Department of Public Works "to investigate and study the feasibility of financing through revenue bonds and constructing a toll highway crossing from India Basin in the City and County of San Francisco easterly to Alameda-Bay Farm Island, and a toll highway crossing from Sierra Point in San Mateo County easterly to Roberts Landing

in Alameda County." It further states: "The study may also include the feasibility of the use of surface craft to provide the crossing services across San Francisco Bay which would otherwise be provided by the highway crossings proposed by this section."

#### FUNDS

Funds to finance the study were obtained from the following sources:

1. The unexpended balance of the 1951 Series D, Refunding and Improvement Toll Bridge Revenue Bonds of the San Francisco-Oakland Bay Bridge.
2. By resolution adopted January 25, 1965, the Authority made available to the Department of Public Works \$150,000 from the Revenue Fund of the San Francisco-Oakland Bay Bridge as authorized by Chapter 2138, Statutes of 1959.
3. The sum of \$300,000 from the aforementioned Revenue Fund as authorized by Chapter 970, Statutes of 1965.

A total of approximately \$470,000 was thus available for expenditure on this study.

The report that follows is the result of the investigations, studies and analyses made in keeping with the intent of the directives by the Toll Bridge Authority and the Legislature.

SOUTH SAN  
FRANCISCO

BRISBANE

BAYSHORE  
FWY

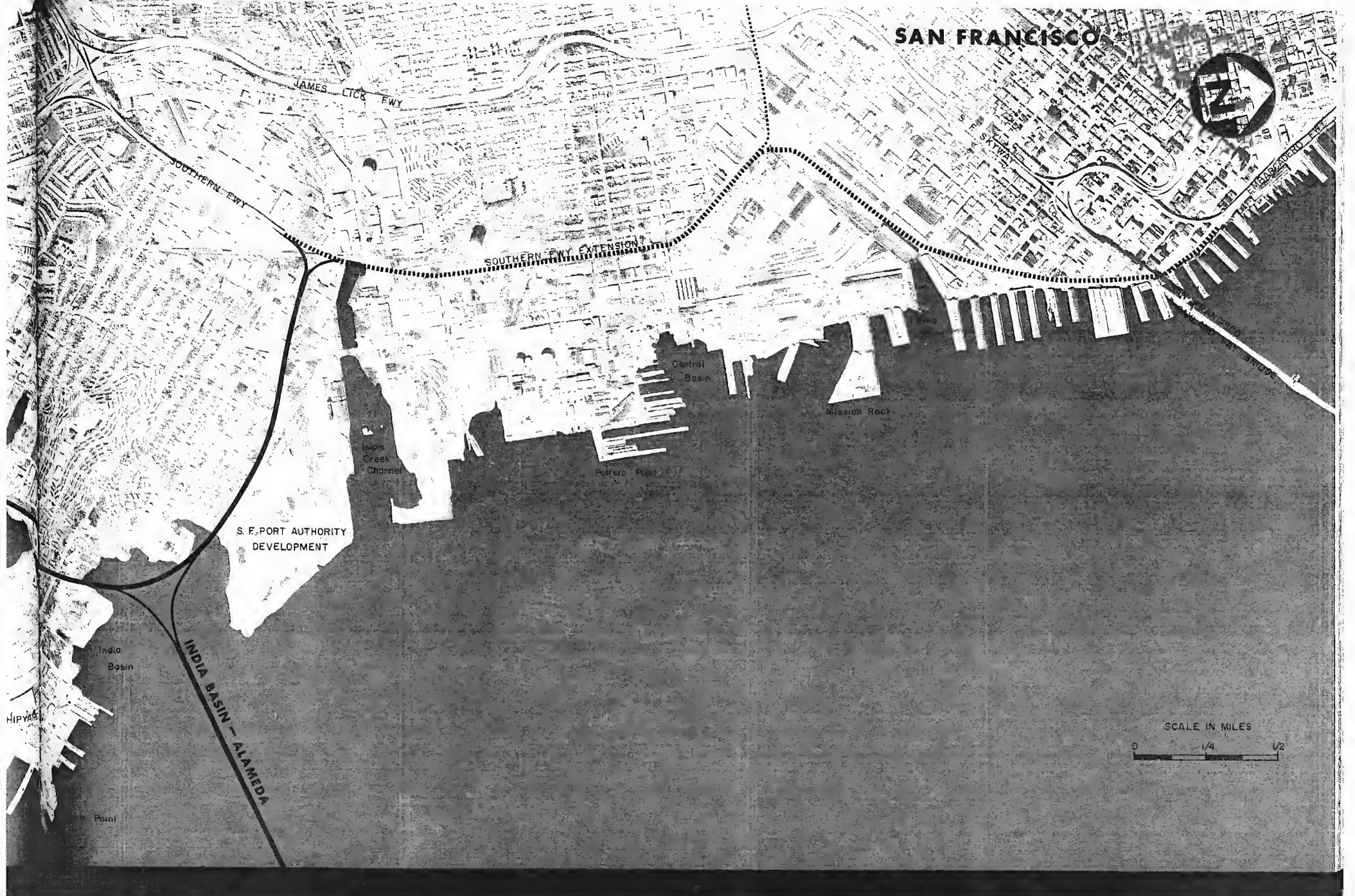
MONTEPE  
EXPY

CANDLESTICK PARK

HUNTER'S POINT FWY

U. S. NAVAL SHIPYARD

# SAN FRANCISCO



GOVERNMENT ISLAND

OAKLAND

NIMITZ  
FWY.

OAKLAND INNER HARBOR

ALAMEDA

U. S. NAVAL AIR STATION - ALAMEDA

INDIA BASIN - ALAMEDA



NIMITZ FWY.

DAVIS ST

OOLITTLE OR.

BAY FARM ISLAND

SCALE IN MILES



METROPOLITAN OAKLAND INTERNATIONAL AIRPORT



# **INDIA BASIN – ALAMEDA**

# CHAPTER II

## HISTORY

In the past (1947-1956) various detailed engineering studies of a crossing between the southern part of San Francisco and Alameda included bridgeheads in the Army Street area in San Francisco and in various locations in Alameda. Since that time, port and industrial development at Army Street have made a more southerly location advisable. In Alameda, routes through the city were previously studied but current considerations favor a route predominantly on the land of the Alameda Naval Air Station. The India Basin-Alameda-Bay Farm Island route, subsequently described and evaluated in detail in this report, has evolved as the route in the northerly traffic corridor which is worthy of consideration.

## TRANSBAY CROSSING

In San Francisco, the crossing begins at a point on the proposed Hunters Point Freeway north of Hunters Point and generally opposite India Basin. The route provides an eight-lane crossing of the main shipping channel east of Hunters Point, either as a high-level bridge or a subaqueous tube, and then proceeds northeasterly to Alameda.

A toll plaza is located near the Alameda shore. From the distribution structure, east of the toll plaza, one leg of the crossing proceeds north, primarily on Navy land, to a crossing under the Estuary to Oakland and a connection with the proposed Grove-Shafter Freeway. Another leg of the crossing leaves the distribution structure in a southeasterly direction and crosses Bay Farm Island and the Oakland Airport to a connection with Davis Street in San Leandro.

## MAIN CHANNEL STRUCTURE

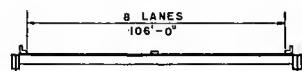
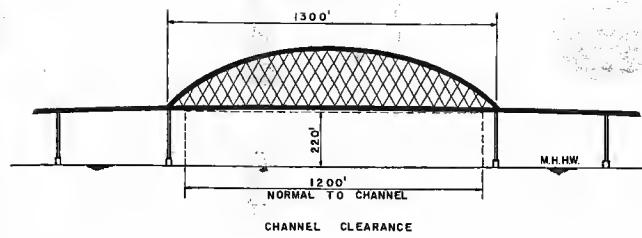
The main channel east of Hunters Point could be crossed either with a high-level bridge or with a subaqueous tube. If a bridge is used over the navigation channel, it would require a vertical clearance of 220 feet above mean higher high water (MHHW) and a single main span with a horizontal clearance of 1,200 feet. If a subaqueous tube were used under the channel, a horizontal clearance of 2,000 feet would be required with a minimum depth of 50 feet below mean lower low water (MLLW). At least 500 feet of the 2,000-foot clearance would have to have a minimum depth of 63 feet below mean lower low water (MLLW).

### High-Level Bridge

Three different structure types have been considered for a high-level bridge: a tied arch, a cable braced girder, and a double deck truss. Other types of high-level bridges could be considered during final design but these three types are thought to give a reliable indication of structural and architectural possibilities and also a reliable scale on construction costs. Architectural drawings and a discussion of the proposed structures will be found beginning on Page 18. Schematic drawings of navigation clearances and roadway sections for each type appear on the opposite page.

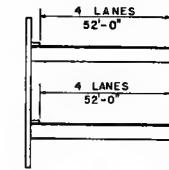
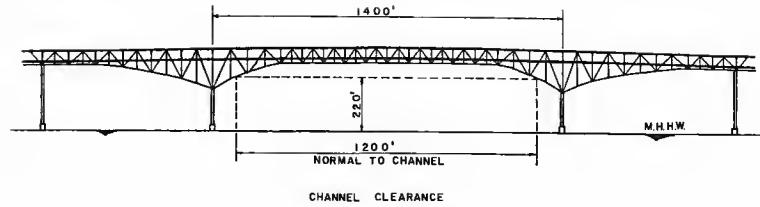
### Subaqueous Tube

At the main channel east of Hunters Point, a subaqueous tube about 8,100 feet long was also investigated. Basically, this portion would consist of two large artificial sand islands--one on each side of the main shipping channel with portal buildings and roadway boat sections providing for the transition from tube to trestle section. The eight-lane tube, in either multiples of two- or four-lane sections, would descend to a roadway elevation 91 feet below mean sea level to provide the required navigational clearance.



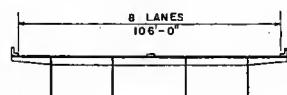
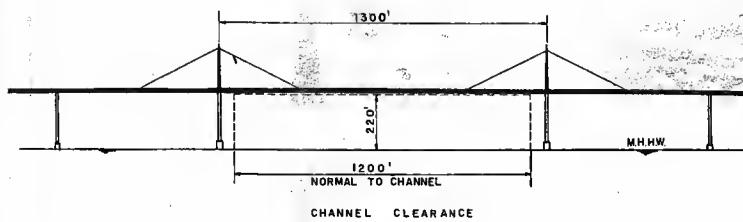
ROADWAY SECTION

**TIED ARCH**



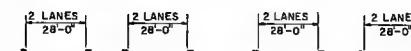
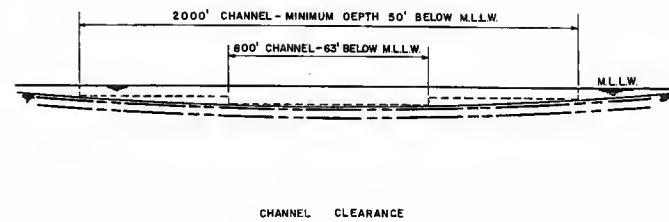
ROADWAY SECTION

**DOUBLE DECK TRUSS**



ROADWAY SECTION

**CABLE BRACED GIRDER**



ROADWAY SECTION

**TUBE**

**NAVIGATIONAL CLEARANCES AND ROADWAY SECTIONS**

## APPROACHES

Many possible approach alignments were developed and evaluated. Those described and shown on the following pages were determined to be the ones most suitable for use in developing project cost estimates.

### West Approach

The west approach joins the Hunters Point Freeway by means of an interchange with on and off ramps in both the northerly and southerly directions. A connection at Innes Avenue is also provided. Proceeding easterly from this interchange, the approach would immediately begin rising to connect to the high-level bridge or would remain as a low-level trestle in the case of the tube alternate.

### East Approach

The east approach system consists of two legs which converge at the toll plaza off the Alameda shore. The northerly leg begins at the Grove-Shafter Freeway in Oakland and proceeds as a four-lane roadway under the Estuary in twin tubes, coming to grade east of Main Street in Alameda. Tentatively, ramp connections to city streets and to the Naval

Air Station are located at Pacific Avenue. Most of this northerly leg is on Navy property. Provision would be made between the shore and the toll plaza for the passage of yachts and small craft.

The southerly leg begins at Davis Street in San Leandro, crosses between the old and new runways at the Oakland International Airport and continues about a mile off the Alameda shore to the toll plaza. Interchanges are planned to serve the airport and the new development now underway on Bay Farm Island. The overwater portions of this approach would be on four-lane, low-level trestle with provision for the passage of yachts and small craft at the San Leandro Bay Channel.

SAN FRANCISCO

KIRKWOOD AVE  
JERROLD AVE  
INNES AVE

EVANS AVE

CLIFFERS POINT FWY

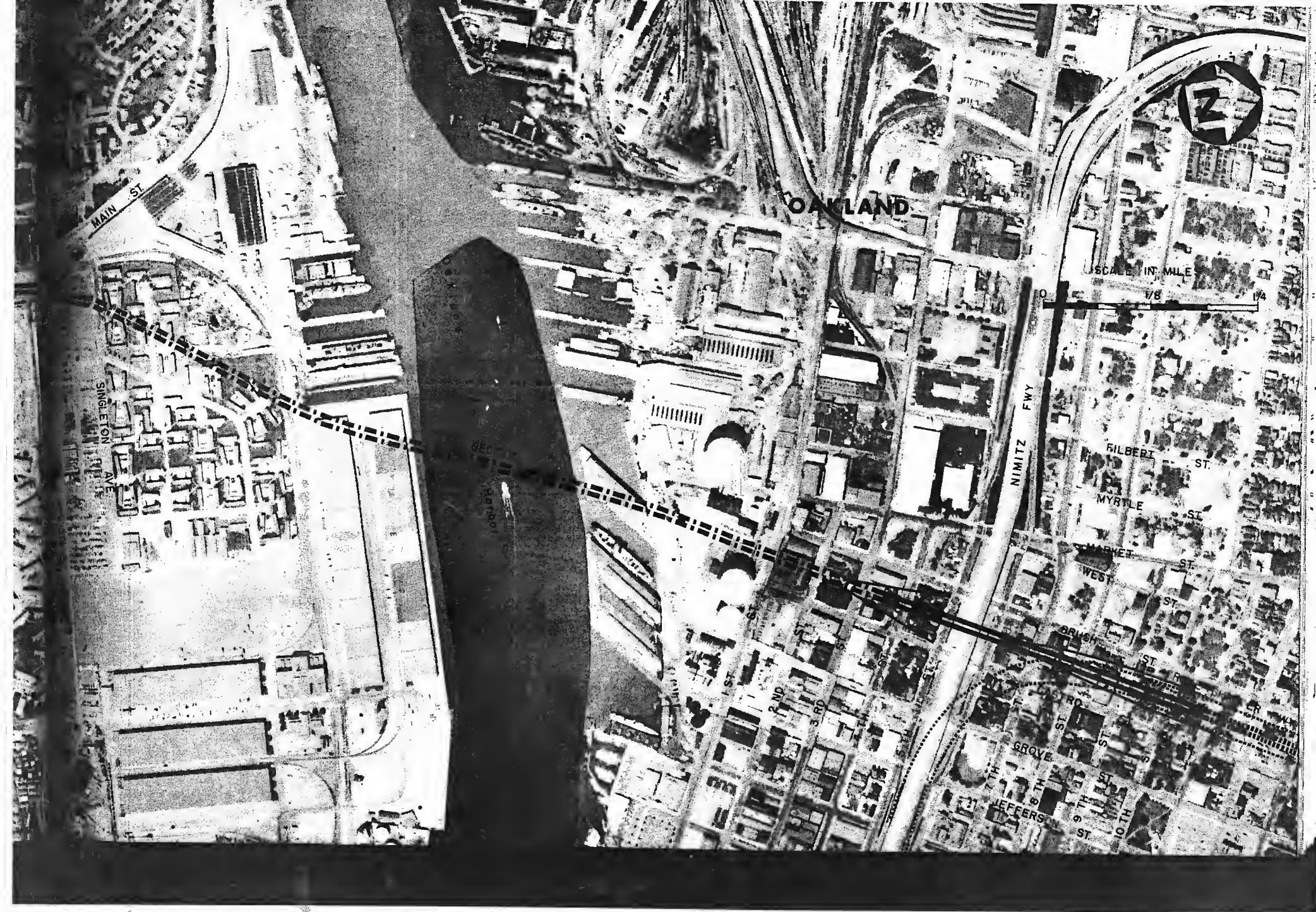
U.S. NAVAL SHIPYARD

S. F. PORT AUTHORITY DEVELOPMENT



U. S. NAVAL AIR STATION - A





## DISCUSSION

The India Basin-Alameda-Bay Farm Island crossing would provide an alternate route for service between the two main population centers of the region--San Francisco and Oakland, plus the remainder of the East Bay, including Contra Costa County.

The westerly terminus at India Basin would provide a direct connection with the proposed Hunters Point Freeway. Using this freeway to the north, there would be access through the Army Street Interchange to the Southern Freeway Extension, currently under construction, leading directly into downtown San Francisco and to the Civic Center area. From the Army Street Interchange, there would also be direct access to the Southern Freeway leading south to the Daly City area. From this freeway, access would also be available to the central and western sections of San Francisco via O'Shaughnessy Boulevard, Ocean Avenue, Junipero Serra Boulevard, and 19th Avenue.

It is important to note that the western termini of the India Basin and Sierra Point crossings are approximately three minutes apart by freeway.

From the bridgehead at India Basin, there would be excellent access to the Brisbane and South San Francisco area via the Hunters Point Freeway.

Using this freeway, traffic could also reach the Guadalupe Canyon Expressway which is being constructed by San Mateo County as a trans-peninsula artery. It could also proceed to points south via the Bayshore Freeway, but would encounter heavy congestion on the Bayshore during the peak periods.

The major freeways to which this crossing would connect, the Hunters Point and Southern Extension, are under construction or proposed and would allow transbay traffic to feed into new facilities, rather than into existing congested routes.

A terminus at India Basin would provide immediate access to new San Francisco Port facilities and to the major industrial areas in San Francisco and northern San Mateo County. This crossing would also provide very good access to the Hunters Point Naval Shipyard, a major industrial complex in the area.

SAN FRANCISCO

SOUTHERN

SOUTHERN HWY EXTENSION

India Basin

INDIA

BASIN

At the easterly end there is a split into two major approaches which would serve a large portion of the most densely populated area in the East Bay. The Alameda-Oakland approach would provide excellent service to Alameda for the many people who commute daily to San Francisco. It also would provide excellent service to the Oakland downtown area. Via the Grove-Shafter Freeway, now under construction, it would provide for through traffic from the rapidly growing Contra Costa County complex to San Francisco and northern San Mateo County. MacArthur Freeway traffic destined for the southern part of San Francisco or San Mateo County would find it convenient to bypass the Bay Bridge and downtown San Francisco via the Grove-Shafter Freeway and this new crossing.

The new tubes under the Estuary would provide Alameda with needed additional access to Oakland and the East Bay Freeway system via the Grove-Shafter Freeway. The existing Posey and Webster Street Tubes are now carrying a heavy load and will reach capacity in a few years. The addition of the new tubes would provide for growth and also accommodate the peak-hour traffic that is now generated by the Naval Air Station. It would remove most of this traffic from Alameda city streets and alleviate future congestion in the existing tubes. There would be very easy access between the Naval Air Station in Alameda and the Hunters Point Naval Shipyard.

The Bay Farm Island-San Leandro approach would provide an additional traffic corridor for relief of the existing congestion on the Nimitz Freeway. With future extension beyond Davis Street in San Leandro, over an onshore expressway or freeway westerly of the Nimitz, eventual relief of the very congested conditions on the Nimitz Freeway would be possible. There would be an alternate access provided for the extensive development now under construction and planned on Bay Farm Island in the City of Alameda.

By reference to the route map provided herein, it can be seen that the southerly approach via Bay Farm Island would provide excellent service to all of the San Leandro area and points south, including U.S. Highway 50 via a short stretch of the Nimitz Freeway.

The high-level bridge at the channel crossing would provide for all necessary navigation clearances, as required by the U.S. Corps of Engineers. On the easterly end, there would be low-level trestle approaches with provision made for the passage of yachts and small craft.

In the development of a high-level bridge, special effort would be made to provide an esthetically pleasing structure. Much emphasis would be placed on architectural treatment in the design, in keeping with the natural beauty of the San Francisco Bay region.



The subaqueous vehicular tube alternate for the navigation channel crossing would require the construction of ventilation buildings and sand islands at the tube portals.

The approach connections to the proposed Hunters Point Freeway would have to be on low-level trestle across India Basin. In discussions with the Port of San Francisco it was indicated that their planning for the development of additional facilities in this area would require a high-level approach to provide navigation clearances. The low-level trestle would, therefore, not meet the Port's requirements.

The toll plaza south of the Alameda Naval Air Station would be on filled land. Under recent legislation, approval of filling the Bay tidelands would fall within the jurisdiction of the San Francisco Bay Conservation and Development Commission.

#### COST ESTIMATE

Preliminary cost estimates of various units of the project, as shown in the tabulation, were prepared in order to evaluate the financial feasibility of the project.

	<u>Bridge</u>	<u>Tube</u>
Bay Crossing	\$128,700,000	\$225,000,000
Alameda-Oakland	<u>79,400,000</u>	<u>79,400,000</u>
Project Total	\$208,100,000	\$304,400,000
Bay Farm Island-San Leandro (State Route 61, Possible Segment)	42,700,000	42,700,000
Hunters Point Freeway (State Routes 87 and 230)	<u>50,000,000</u>	<u>50,000,000</u>
Combined Total	\$300,800,000	\$397,100,000

Bay Crossing: Includes the interchange to the Hunters Point Freeway, the approach spans, the navigational channel crossing and the toll plaza.

Alameda-Oakland: Includes a short section of approach structure, the route through Alameda, a four-lane Estuary tube and the connection to the Grove-Shafter Freeway.

Bay Farm Island-San Leandro: Includes portions of the proposed State Highway Route 61; a distribution structure east of the toll plaza and a section off the south shore of Alameda through Oakland Airport terminating on Davis Street in the vicinity of Doolittle Drive.

Hunters Point Freeway: Includes those portions of adopted State Highway Routes 87 and 230 known as the Hunters Point Freeway.

San Leandro Bay

**BAY FARM ISLAND**

NAVAL AIR STATION - ALAMEDA

INDIA BASIN - ALAMEDA

# **SIERRA POINT—ROBERTS LANDING**

# CHAPTER III

## HISTORY

This alignment was first proposed to the California Toll Bridge Authority in April 1959, as a route which, if constructed at that time, would not interfere with the existing shore line developments. Initially, the western terminus of the crossing in this corridor was located at Sierra Point. In meetings with local groups as this study progressed, a proposal was made for a more northerly terminus within the corridor. The City of Brisbane initiated this proposal in its General Plan, and it received the support of San Mateo County and other cities in the county. At this new location, it would be more easily coordinated with the general planning of the adjacent communities and better connections could be provided to the existing and proposed freeway and expressway systems.

In the following paragraphs, this crossing alignment is described and evaluated and the results of the Corps of Engineers' studies for a barrier at this location are reviewed.

## TRANSBAY CROSSING

The western end of this crossing is in San Mateo County approximately midway between Candlestick Point and Sierra Point. From there, it extends in a general southeasterly direction across San Francisco Bay to a point on the Alameda County shore line near Roberts Landing and then to a connection with the freeway system in San Leandro. Toll plaza facilities would be constructed on a mole fill in the shallow waters near the Alameda County shore. On the west side of the Bay, connections would be made to the Bayshore Freeway and the proposed Hunters Point Freeway. It would also connect to the Guadalupe Canyon Expressway. On the east, the approach alignment follows San Lorenzo Creek to make connections with the Nimitz Freeway and U. S. Highway 50.

## CROSSING TYPES

The two types of construction studied for this approximate 12.5-mile crossing were:

1. A low trestle with a high-level bridge over the navigation channel, and
2. An earthfilled barrier, including locks to permit ship passage, and a high-level bridge over the navigation channel for vehicular traffic.

A six-lane highway facility is proposed to handle the estimated volume of traffic.

#### Trestle and High-Level Bridge

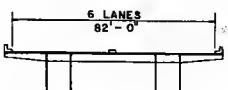
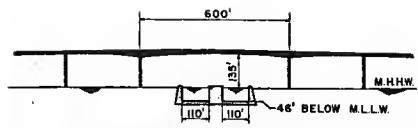
The Sierra Point-Roberts Landing crossing would traverse one of the widest sections of San Francisco Bay. Water depths over much of this area are relatively shallow, thus limiting passage of deep-draft vessels to a single, narrow, dredged channel located in the western section of the Bay. The structure for this alternate would consist of a long, low trestle section about ten miles in length, leading to a high-level bridge over the navigation channel, followed by another short section of trestle connecting to existing or proposed highways. This crossing would be similar to the San Mateo-Hayward Bridge located some eight miles farther south.

Four different types of structures were considered for a crossing of the navigation channel. They are: (1) an orthotropic deck plate box girder, (2) tied arch, (3) orthotropic deck truss, and (4) a double deck truss. The first three have a single roadway while the final one has, as its name implies, two decks. Each structure would have a 750-foot main span providing a 500-foot navigation channel. A minimum vertical clearance of 135 feet above mean higher high water (MHHW) would also be provided for each. Architectural drawings and a discussion of the proposed

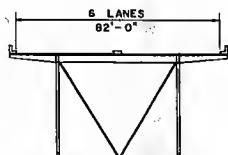
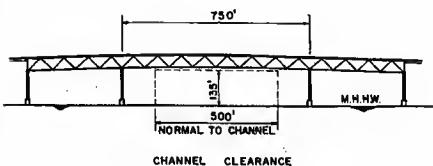
structures will be found beginning on Page 44. Schematic drawings of navigational clearances for each type are shown on the opposite page.

#### Barrier

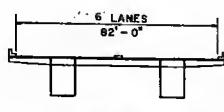
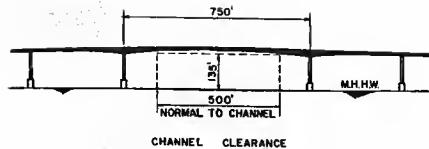
For purposes of this study, the alignment being considered as a crossing site was also assumed as a barrier site incorporating transportation facilities. Thus, construction would consist of an earth fill with provision for ship locks off the western shore to permit passage of vessels through the barrier. Details of the barrier would be similar to those proposed by the Corps of Engineers and are shown in the Drawing on Page 52. The structure over the navigation channel and locks would be similar to those proposed for the bridge crossing except that the main span length would be reduced from 750 feet to 600 feet.



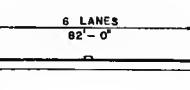
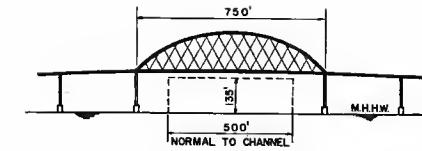
**ORTHOPTROPIC BOX GIRDER  
FOR BARRIER STUDY**



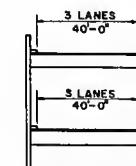
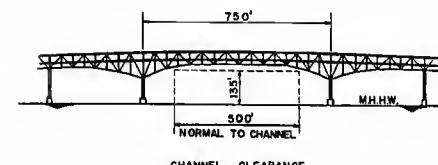
**ORTHOPTROPIC DECK TRUSS**



**ORTHOPTROPIC BOX GIRDER**



**TIED ARCH**



**DOUBLE DECK TRUSS**

## NAVIGATIONAL CLEARANCES AND ROADWAY SECTIONS

## APPROACHES

Many possible approach alignments were developed and evaluated. Those described and shown on the following pages were determined to be the ones most suitable for use in developing project cost estimates.

### West Approach

The west approach, which is located within the corporate limits of the City of Brisbane, consists of connections to existing and proposed freeways in the vicinity of this project. A full interchange would be made with the existing Bayshore Freeway with provisions for connections to the proposed Guadalupe Canyon Expressway. This expressway, to be built by San Mateo County and others, will ultimately connect the Bayshore Freeway in Brisbane with the Junipero Serra Freeway in Daly City. In addition, interchange connections would be provided to the proposed Hunters Point Freeway..

### East Approach

The east approach would be two and one-half miles long. It would include the toll plaza and extend in a general easterly direction to connect with the Nimitz Freeway in the vicinity of the existing Washington Avenue Interchange and to U. S. 50. From the shore line near Roberts Landing,

the approach proceeds in a southeasterly direction to the boundary line between San Lorenzo and San Leandro. It follows along the southerly side of San Lorenzo Creek and then curves to the northeast to make connections with the Nimitz Freeway. As previously mentioned, this line was used for purposes of developing cost estimates for this report. Other locations are also possible. The toll plaza complex would be located offshore, similar to that for the San Mateo-Hayward Bridge, and would include an administration building, a maintenance building, and toll collection facilities.

BRISBANE



BAYSHORE  
F.W.Y.

MILES

1/8 1/4



Roberts Landing

San Lorenzo Creek

SIERRA POINT - ROBERTS LANDING

SOUTHERN  
VIA SORRENTO  
VIA SONATA  
VIA RÉPRESA  
VIA NUEVA  
VIA SECO  
VIA ESMOND  
LEWELLING ST.  
BELLEAU  
BRECKENRIDGE  
BELDING  
SAYRE  
FARNSWORTH DR.  
MONTREAL  
HEBRON  
VINVING  
CALGARY  
CRANBROOK  
WICKS  
PACIFIC R.R.  
BLVD.

SAN LORENZO

SAN LEANDRO



FWY

NIMITZ

WASHINGTON  
AVE

R.R.

PACIFIC

SOUTHERN

HESPERIAN  
DERMODY  
DOANE  
DREW  
POMONA  
RUTGERS  
TULSA  
EMPIRE  
LASSAR

BLVD  
COLBY  
WESTERN  
PACIFIC  
R.R.

USER  
TRACK

U.S.  
HIGHWAY  
101

SCALE IN MILES

1/8

1/4

## DISCUSSION

The Sierra Point-Roberts Landing crossing connects two developing areas in the San Francisco Bay region. Construction of a bridge between these two areas would assist in their growth.

It is important to note that the western termini of the Sierra Point and India Basin crossings are approximately three minutes apart by freeway. Using the Hunters Point or Bayshore Freeways north from Sierra Point, access to all of San Francisco would be available. Most of the traffic leading north would use Hunters Point Freeway, a new facility with ample capacity. Traffic to the south would use the Bayshore Freeway.

At the easterly end of this crossing, there are several alternates which could be used to provide a connection with the existing freeway network. Three such alternates have been studied; one of these, using the existing line of severance provided by San Lorenzo Creek, has been used for purposes of this report. Although there is some interference with school property on each of the alternates, discussions with school district representatives brought out no unsolvable problems. Traffic destined for points north or south of the eastern terminus could use the Nimitz Freeway. That destined for points to the east, has access to U. S. Highway 50 via connecting freeways.

This line could also be connected with an inland expressway or freeway, which may be developed west of the Nimitz Freeway to provide an additional north-south traffic corridor through the area.

The high-level bridge at the channel crossing would provide for all necessary navigation clearances, as required by the U. S. Corps of Engineers. There would be low-level trestle approaches on both ends. On the easterly end, provision would be made for the passage of yachts and small craft beneath the structure.

The toll plaza at the easterly end of the crossing would be on filled land. Under recent legislation, approval of filling the Bay tidelands would fall within the jurisdiction of the San Francisco Bay Conservation and Development Commission.

In the development of a high-level bridge special effort would be made to provide an aesthetically pleasing structure. Much emphasis would be placed on architectural treatment in the design, in keeping with the natural beauty of the San Francisco Bay region.

The Barrier alternate at this location was developed along the lines of that used in the U. S. Army Corps of Engineers report on the subject. An independent estimate of cost was made. It agrees substantially with the Corps of Engineers' estimate, but includes additional costs for the approaches that are required.

The difference in cost between a combined highway and barrier project and a single-purpose highway crossing is \$142,900,000. This incremental cost for the barrier would require an annual benefit of \$5,700,000 in order for the cost-benefit ratio to have a value of unity. When compared with the Corps' estimated annual flood control and land reclamation benefits of \$2,550,000 for the barrier, it indicates that the additional cost of the crossing attributable to the barrier is not justified.

It should be noted that most of the estimated annual benefits for a barrier in this location are based upon the reduced cost of the anticipated filling of large areas of Bay tidelands for commercial and residential development. Since the Corps of Engineers report was published in 1963, authority for approval of filling the Bay tidelands has been vested in a new agency, the San Francisco Bay Conservation and Development Commission.



If the policy of this Commission should result in a reduction in the reclamation of tidelands, the Corps of Engineers estimate of annual benefits of \$2,550,000 for the barrier would be reduced and would have a further adverse effect on the cost-benefit ratio.

After discussion with the staff of the Corps of Engineers, it was determined that no additional data subsequent to its report is available that would change any of the conclusions of the 1963 report concerning the Sierra Point-Roberts Landing barrier.

#### COST ESTIMATE

Preliminary cost estimates of various units of the project were prepared in order to evaluate the financial feasibility of the project.

	<u>Bridge</u>	<u>Barrier</u>
Bay Crossing	\$125,600,000	\$268,500,000
San Leandro Approach	<u>34,100,000</u>	<u>34,100,000</u>
Project Total	\$159,700,000	\$302,600,000
Hunters Point Freeway (State Routes 87 and 230)	<u>50,000,000</u>	<u>50,000,000</u>
Combined Total	\$209,700,000	\$352,600,000

Bay Crossing: Includes an interchange at the existing Bayshore Freeway, a high-level bridge across the navigation channel and a low-level structure across the remainder of the Bay and a toll plaza off the San Leandro shore.

For the barrier alternate, the Bay Crossing would provide for the same traffic facilities as the bridge alternate and a control barrier across the Bay with navigation locks and water-circulating facilities.

San Leandro Approach: Includes the interchange with the Nimitz Freeway, the interchange with the freeway extension of U.S. Highway 50 and the remainder of the route along San Lorenzo Canal to the toll plaza offshore.

Hunters Point Freeway: Includes those portions of adopted State Highway Routes 87 and 230 known as the Hunters Point Freeway.

# CHAPTER IX

In the preceding chapters the various factors which must be considered in determining the feasibility of an additional crossing have been presented. In this chapter the more important findings are discussed and evaluated, and the conclusions are presented.

## DISCUSSION AND EVALUATION

The economic development of a region is particularly dependent on the free flow of traffic. Business, educational, cultural, and recreational activities need an efficient transportation system in order to flourish. Without adequate transbay crossings and connections to freeway systems, healthy growth will be impossible and movement of people and goods seriously restricted. Easy access to and from the cities for trucks is required as this mode of transportation grows. Rapid transit provides additional capacity for transportation of people, especially at the peak periods. A new crossing would provide an alternate route not only for movement of passenger vehicles but also for transportation of goods by motor vehicle and would result in reduction of congestion on existing facilities.

A comparison of the two crossings as to traffic service follows:

### India Basin-Alameda-Bay Farm Island

The India Basin route would improve access between the two most densely populated areas in the San Francisco Bay region and provide service for a far greater amount of traffic. It would serve the new port development and the industrial complex in the southern section of San Francisco and northern section of San Mateo County. It would connect to freeways which are under construction or presently planned that will be new arteries capable of carrying and distributing the bridge traffic. It would provide service between central San Mateo County and the Oakland metropolitan area in a reasonably direct route.

On the East Bay end, this crossing would provide excellent access to and from Alameda, the Port of Oakland facilities, the Oakland Airport, the downtown area of Oakland, and would also develop a new traffic corridor parallel to the Nimitz Freeway, which is now extremely congested. It would provide access to the residential areas of Oakland, Berkeley, and fast growing Contra Costa County via the Grove-Shafter Freeway. The southerly leg leads directly into San Leandro or the rapidly expanding central Alameda County area.

The overall effect of the India Basin crossing on the region is good.

Direct benefits will be felt in San Francisco, northern San Mateo County, Oakland, Berkeley, Contra Costa County, Alameda, and in San Leandro.

#### Sierra Point-Roberts Landing

The Sierra Point crossing connects two growing areas. The growth in the Sierra Point area, including the South San Francisco industrial development, is already well advanced. At the easterly terminus in central Alameda County, the growth is also proceeding at a healthy rate.

This route would provide a direct connection between northern San Mateo County and the San Joaquin Valley via U.S. Highway 50. On the west side, this crossing would provide a tie to San Mateo County's proposed Guadalupe Canyon Expressway, which connects to highways and communities along the coast.

From its westerly terminus near Brisbane, the Sierra Point crossing provides some sections of northern San Mateo County north of the San Francisco International Airport with improved access to the San Leandro-Hayward area.

The overall effect of the Sierra Point crossing on the region it serves is good.

#### Evaluation of Benefits

Each crossing has benefits which accrue to the areas connected. It is necessary to evaluate the relative ability of each route to provide adequate traffic capacity where it is needed, now and in the future.

Reference to the traffic estimates for 1990, shown on page 83 reveal some significant data.

Assuming an India Basin Bridge in operation, the Bay Bridge would carry 113,000 vehicles per day in 1990 and the India Basin crossing would carry 76,000. In contrast, with the Sierra Point crossing assumed in operation, the Bay Bridge would carry 154,000 vehicles per day and the Sierra Point crossing 16,000. In both cases, the San Mateo-Hayward Bridge would carry between 25,000 and 30,000 vehicles daily, well below the capacity of the new \$70 million structure now being built. With the India Basin crossing in operation, the Bay Bridge, the new bridge, and the San Mateo Bridge would all have room for growth well beyond the year 1990. This is not true in the case of the Sierra Point crossing, since the Bay Bridge would continue in its congested condition with traffic volumes exceeding 154,000 vehicles daily in 1990. Since the most serious effect of congestion is felt at the peak periods, reduction of traffic on the Bay Bridge would be of great benefit to the daily commuters. It would relieve a situation

where the slightest breakdown or minor accident causes a restriction in free flow of traffic for lengthy periods.

The ends of the two routes studied are approximately three miles apart on each side of the Bay. The chief difference between the two is that, while arriving at almost the same places at the ends, the India Basin route passes close to or through heavily developed residential, commercial, and industrial areas which it serves very well. Conversely, the Sierra Point-Roberts Landing crossing traverses 12 miles of the Bay without service except at the termini. The two routes perform very different services overall, but while they provide access to the same general areas, the resulting benefits are greater for the India Basin location.

The India Basin crossing, together with existing bridges, makes available transbay capacity where needed and provides room for growth beyond the year 1990. Sierra Point does not provide this additional capacity and leaves present facilities overcrowded.

The effect that financing of the Bay Area Rapid Transit Tube has on the Southern Crossing is developed in Chapter VII. The principal findings of that chapter show that with the current limitation of \$133 million, either one of the crossings could be financed beginning in 1968. If the commitment is raised to \$178 million, construction of a crossing would

be delayed by 5 to 7 years. If the commitment were to be above \$178 million, the tube could not be financed under existing bond covenants. For financial planning to proceed on a sound basis, the limit of obligations for the Bay Area Rapid Transit Tube must be determined.

#### SUMMARY OF CONCLUSIONS

1. From a planning and engineering standpoint, it is feasible to construct either crossing. An esthetically pleasing design can be achieved in keeping with the natural beauty of the San Francisco Bay region.
2. The project cost for the India Basin-Alameda-Bay Farm Island is \$208,100,000 and for Sierra Point-Roberts Landing is \$159,700,000. Those portions of the proposed State Highway System which will connect to the India Basin Project will cost \$92,700,000 and for the Sierra Point Project, \$50,000,000. Concurrent planning would be required on the combined crossing and approaches.
3. Current obligations of the Toll Revenue Fund will permit financing of only one of the two crossings studied.
4. If the commitment of the Toll Revenue Fund for the construction of the BARTD tube remains at \$133 million, construction of a new crossing could begin in 1968. If the commitment is increased to \$178 million, this would have a serious effect on the financing of a Southern Crossing causing a delay of 5 to 7 years beyond 1968.

5. A comparison of the two routes shows that the India Basin-Alameda-Bay Farm Island line provides superior service for both present and future transbay traffic needs.
6. The India Basin Crossing would relieve the San Francisco-Oakland Bay Bridge of congestion and would provide for growth of traffic well beyond the year 1990.
7. The Sierra Point Crossing does not provide this relief. The San Francisco-Oakland Bay Bridge would continue to carry traffic beyond its comfortable capacity.
8. If no additional bridge is constructed, the San Francisco-Oakland Bay Bridge will continue to be congested. It is estimated that it would carry 150,000 vehicles per day in 1980, including the beneficial effect of the operation of the Bay Area Rapid Transit System.
9. A combined highway and barrier crossing between Sierra Point and Roberts Landing is not economically feasible because the flood control and land reclamation benefits do not justify the additional costs attributable to the barrier.
10. A surface craft system could not compete with other mass transit facilities and could not provide service comparable to that of an additional crossing.

## RECOMMENDATIONS

Based upon the conclusions presented in this report, the following recommendations are presented for consideration:

1. The India Basin-Alameda-Bay Farm Island bridge route should be selected as the additional crossing to be constructed. A decision on the route would allow efficient coordination of the planning of all affected agencies.
2. Funds should be made available to complete the planning necessary to determine the detailed location of approach road connections, to obtain the necessary permits, to initiate utility and right-of-way negotiations, and to consult and coordinate with affected communities and agencies.
3. A definite financial plan should be developed for the Southern Crossing taking into consideration all existing and possible future obligations of the Toll Revenue Fund. In developing this financial plan, consideration should be given to the need for additions and improvements to the San Mateo-Hayward and Dumbarton Bridges.